

**Serviceability Limit State - Crack Control to BS 5400 : Part 4 1990**

**Section : Free Abutment Wall**

Concrete Strength  $f_{cu}$  = 40 N/mm<sup>2</sup>  
 Steel Strength  $f_y$  = 500 N/mm<sup>2</sup>  
 Youngs Mod for Steel  $E_s$  = 200000 N/mm<sup>2</sup>

Concrete	
Breadth(B)	Depth(D)
1000	1000

Environment Conditions for nominal cover - Table 13 : Severe

Reinforcement controlling crack width :

Cover from notional surface = 35 mm  
 Bar diameter ( $\phi$ ) = 40  
 Spacing ( $s$ ) = 150

Steel Reinforcement	
Area( $A_s$ )	Depth(d)
Comp 0	0
Tension 8378	920

Factored Dead Load Moment = 868 kNm  
 Factored Live Load Moment = 495 kNm

Youngs Mod for Concrete  $E_c$  = 31  
 Cl. 4.3.2.1b) Modified  $E_c$  = 21.1291269

$x/d$  = 0.338  
 $x$  = 310.833

Second Mom of Area of Cracked Section = 3.944E+10  
 Steel Stress = 199.278  
 Steel Strain = 0.00099639

Distance from Comp Face to notional surface = 975  
 Strain at notional surface = 0.00108635  
 Stiffening Effect of Conc in Tension = 0.00018852  
 Modified Strain at notional surface = 0.00089783  
 Distance from crack to bar = 73.005

Cl 5.8.8.2 Design Crack Width = 0.1771 mm

Maximum Crack Width from Table 1 : 0.25 mm Hence OK

Cl 4.1.1.3 Compressive stress in concrete = 10.7424 N/mm<sup>2</sup>  
 Allowable compressive stress = 20 N/mm<sup>2</sup> Hence OK

Tensile stress in steel = 199.278 N/mm<sup>2</sup>  
 Allowable tensile stress = 375 N/mm<sup>2</sup> Hence OK